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Report on the individual review of the annual submission of Slovakia submitted in 2014*

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2014 annual submission of Slovakia, coordinated by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 22 to 27 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Riccardo de Lauretis (Italy) and Mr. Simon Eggleston (United Kingdom of Great Britain and Northern Ireland); energy – Mr. Kennedy Amankwa (Ghana), Ms. Emilia Hanley (Ireland), Mr. Michael Smith (New Zealand) and Mr. Hongwei Yang (China); industrial processes and solvent and other product use – Mr. Samir Tantawi (Egypt) and Mr. David Thistlethwaite (United Kingdom); agriculture – Ms. Savitri Garivait (Thailand) and Mr. Steen Gyldenkærne (Denmark); land use, land-use change and forestry (LULUCF) – Ms. Andrea Brandon (New Zealand), Mr. Nguyen Dinh Hung (Viet Nam) and Mr. Xiaoquan Zhang (China); and waste – Ms. Juliana Bempah (Ghana) and Ms. Katja Pazdernik (Austria). Ms. Bempah and Mr. Eggleston were the lead reviewers. The review was coordinated by Mr. Vlad Trusca (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Slovakia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified. The expert review team (ERT) notes that the 2013 annual review report of Slovakia was published after 15 April 2014, which may have affected the Party's ability to implement recommendations and encouragements made in the previous review report.

3. All recommendations and encouragements included in this report are based on the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" (hereinafter referred to as the UNFCCC Annex I inventory reporting guidelines) adopted through decision 24/CP.19. Therefore, when preparing the next annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by Slovakia was carbon dioxide (CO_2), accounting for 82.0 per cent of total GHG emissions[1] expressed in carbon dioxide equivalent (CO_2 eq), followed by methane (CH_4) (10.0 per cent) and nitrous oxide (N_2O) (6.8 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.1 per cent of the overall GHG emissions in the country. The energy sector accounted for 68.5 per cent of total GHG emissions, followed by the industrial processes sector (18.5 per cent), the agriculture sector (7.6 per cent), the waste sector (5.0 per cent) and the solvent and other product use sector (0.4 per cent). Total GHG emissions amounted to 43,118.34 Gg CO_2 eq and decreased by 41.4 per cent between the base year[2] and 2012. The ERT concluded that the description in the

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

5. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.

6. Information to be included in the compilation and accounting database can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year[a] to 2012

			Gg CO_2 eq								Change (%)
		Greenhouse gas	Base year	1990	1995	2008	2009	2010	2011	2012	Base year-2012
Annex A sources		CO_2	61 805.49	61 805.49	44 574.60	40 366.47	36 521.21	37 430.61	37 233.46	35 351.63	-42.8
		CH_4	5 186.80	5 186.80	4 614.02	4 678.46	4 346.22	4 216.29	4 252.05	4 327.39	-16.6
		N_2O	6 338.78	6 338.78	4 145.62	3 842.20	3 528.98	3 401.66	3 008.17	2 944.17	-53.6
		HFCs	NA, NO	NA, NO	11.65	335.17	380.08	420.16	439.87	452.03	NA
		PFCs	271.37	271.37	114.32	36.16	17.76	21.15	17.00	21.71	-92.0
		SF_6	0.03	0.03	9.91	18.51	19.39	19.90	20.74	21.40	68 785.2
KP-LULUCF	Article 3.3[b]	CO_2				-219.66	-157.34	-261.03	-375.51	-382.05	
		CH_4				0.00	0.00	0.00	0.00	0.00	
		N_2O				0.37	0.28	0.29	0.26	0.26	
	Article 3.4[c]	CO_2	NA			NA	NA	NA	NA	NA	NA
		CH_4	NA			NA	NA	NA	NA	NA	NA
		N_2O	NA			NA	NA	NA	NA	NA	NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2012

			Gg CO_2eq								*Change (%)*
		Sector	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*
Annex A sources		Energy	55 682.17	55 682.17	38 836.13	33 856.42	31 180.52	31 494.14	31 414.77	29 534.03	–47.0
		Industrial processes	9 173.90	9 173.90	8 598.79	9 793.75	8 287.08	8 564.38	8 057.71	7 993.52	–12.9
		Solvent and other product use	147.15	147.15	121.53	166.59	164.38	164.35	170.54	172.93	17.5
		Agriculture	7 226.93	7 226.93	4 423.94	3 170.58	3 091.50	3 137.48	3 162.30	3 261.39	–54.9
		Waste	1 372.32	1 372.32	1 489.72	2 289.64	2 090.15	2 149.44	2 165.98	2 156.47	57.1
		LULUCF	NA	–9 007.77	–9 802.29	–5 920.14	–6 208.13	–5 584.13	–6 203.46	–8 102.83	NA
		Total (with LULUCF)	**NA**	**64 594.70**	**43 667.84**	**43 356.83**	**38 605.51**	**39 925.64**	**38 767.84**	**35 015.51**	**NA**
		Total (without LULUCF)	**73 602.47**	**73 602.47**	**53 470.12**	**49 276.97**	**44 813.64**	**45 509.78**	**44 971.30**	**43 118.34**	**–41.4**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation				–353.04	–365.81	–400.42	–413.42	–435.82	
		Deforestation				133.74	208.75	139.68	38.16	54.02	
		Total (3.3)				**–219.29**	**–157.06**	**–260.74**	**–375.25**	**–381.80**	
	Article 3.4[d]	Forest management				NA	NA	NA	NA	NA	NA
		Cropland management	NA			NA	NA	NA	NA	NA	NA
		Grazing land management	NA			NA	NA	NA	NA	NA	NA
		Revegetation	NA			NA	NA	NA	NA	NA	NA
		Total (3.4)	**NA**			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for all gases. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 15 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR. Slovakia further submitted a revised NIR on 20 May 2014. Slovakia also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2014. Slovakia further submitted revised SEF tables on 24 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. Slovakia submitted revised emission estimates and revised estimates for KP-LULUCF on 10 November 2014 in response to the list of potential problems and further questions raised by the ERT during the review (see paragraphs 31, 36, 39, 59, 62 and 102 below). The values used in this report are those submitted by Slovakia on 10 November 2014.

9. The list of other materials used during the review is provided in annex II to this report.

2. Questions of implementation raised in the 2013 annual review report

10. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

11. Table 3 contains the ERT's overall assessment of the annual submission of Slovakia. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on completeness		
Annex A sources[a]	Complete	Mandatory: none
		Non-mandatory:
		Slovakia reports CO_2 emissions from coal mining and handling as "NO" although coal mines do occur in the country. Please see paragraph 40 below for category-specific findings
		The ERT encourages Slovakia to estimate and report emissions from all non-mandatory

Issue	*Expert review team assessment*	*General findings and recommendations*
		categories
Land use, land-use change and forestry[a]	Complete	Mandatory: none
		Non-mandatory: none
KP-LULUCF	Complete	
The ERT's findings on recalculations and time-series consistency		
Transparency of recalculations	Sufficiently transparent except the energy and industrial processes sectors	Please see paragraphs 20, 29–31, 42, 50 and 54 below for category-specific findings
Time-series consistency	Sufficiently consistent	Please see paragraphs 29, 37, 52, 56, 78, 84 and 86 below for category-specific findings
The ERT's findings on QA/QC procedures	Sufficient	Slovakia has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan. Slovakia performs category-specific QA/QC procedures and verification activities
		The ERT recommends that Slovakia improve the QA/QC plan for the energy sector, detailing the improvements planned and the relevant timetable to implement them
		Please see paragraphs 28, 44, 48, 51, 90 and 100 below for category-specific recommendations
The ERT's findings on transparency	Not sufficiently transparent	Please see table 4 and paragraphs 23, 25, 29, 31, 37, 42, 44, 46, 47, 49, 50–52, 55, 59, 61, 67, 69, 71–72, 76–80, 83–86, 89, 90, 91, 96 and 99 below for category-specific recommendations

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, ERT = expert review team, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NO = not occurring, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

12. The NIR described the national system for the preparation of the inventory. There were changes to the national system for the 2014 annual submission, as identified by Slovakia in its NIR, which led to an increase in the quality of the NIR and an increase in the capacity of the personnel involved in the preparation of the national inventory. The Department of Emissions and Air Quality Monitoring (OMEaKO) of the Slovak

Hydrometeorological Institute has overall responsibility for the national inventory, as delegated by the Ministry of the Environment (MZP). OMEaKO is also responsible for the annual update of the quality assurance/quality control (QA/QC) plan.

13. Other organizations are also involved in the preparation of the inventory. The preparation of the inventory at sectoral level is highly decentralized and delegated to sectoral experts at external institutions and organizations. The external institutions and organizations cooperate under annual contracts, based on framework contracts for long periods. The sectoral experts nominated into the Slovak national system and their relevant organizations are listed in table 1.2 of the NIR.

14. The NIR also contains information on the improvements planned for future submissions. The main pending issues not yet addressed by Slovakia, but planned for the next submission, relate to the harmonization of different data sources for the energy balance, the implementation of the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) and the preparations for estimating emissions for the agriculture and LULUCF sectors in the context of the new Agriculture, Forestry and Other Land Use (AFOLU) chapter in the 2006 IPCC Guidelines, including the development of country-specific emission factors (EFs) for CH_4 from enteric fermentation and N_2O from manure management and agriculture soils.

Inventory preparation

15. Table 4 contains the ERT's assessment of Slovakia's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
Assessment of inventory preparation by Slovakia

Issue	*Expert review team assessment*	*ERT findings and recommendations*
Key category analysis		
Was the key category analysis performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Level and trend analysis performed, including and excluding LULUCF
Approach followed?	Both tier 1 and tier 2	
Were additional key categories identified using a qualitative approach?	No	
Has Slovakia identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	The information reported in the NIR in the general chapter has not been updated and it is not in agreement with information reported in the KP-LULUCF tables and in the annex of the NIR The ERT recommends that Slovakia increase the transparency of its reporting on this aspect

Issue	*Expert review team assessment*	*ERT findings and recommendations*
Does Slovakia use the key category analysis to prioritize inventory improvements?	Yes	The ERT recommends that Slovakia include in the NIR the relevant information, provided during the review, for the planning and prioritization of the improvements for the next submission
Assessment of uncertainty analysis		
Approach followed?	Both tier 1 and tier 2	A tier 2 approach was used for the energy, industrial processes, solvent and other product use and waste sectors and it is planned for the LULUCF sector
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	The uncertainty analysis results excluding the LULUCF sector have not been reported in the NIR, but were provided during the review The ERT encourages the Party to report uncertainty values with and without LULUCF in the NIR and the references for uncertainty factors of the AD and EFs
Quantitative uncertainty (including LULUCF)	Level = 14.2% Trend = 5.1%	
Quantitative uncertainty (excluding LULUCF)	Level = 3.9% Trend = 1.5%	

Abbreviations: AD = activity data, EF = emission factor, ERT = expert review team, IPCC good practice guidance = the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

Inventory management

16. There were no changes to the inventory management process carried out by Slovakia for the 2014 annual submission. The description of the inventory management process, as contained in the report of the individual review of the annual submission of Slovakia submitted in 2013,[3] remains relevant.

[3] FCCC/ARR/2013/SVK, paragraph 12.

5. Follow-up to previous reviews

17. Slovakia performed many changes for the 2014 submission in order to comply with the relevant recommendations made in previous review reports. The ERT welcomes the improvements made, which are reported in detail in the NIR (chapter 10 contains an extensive list of all changes). The most important changes performed are:

(a) Addressing partially the consistency between the three sources of activity data (AD) in the energy sector, while some improvements are planned for the 2015 submission;

(b) Improving the estimates of soil carbon stock changes for afforestation, reforestation and deforestation activities under Article 3, paragraph 3 of the Kyoto Protocol;

(c) Estimating N_2O emissions from disturbances associated with land-use conversion in cropland (deforestation) as well as from biomass burning on lands under afforestation and reforestation;

(d) Updating basic parameters, such as the biomass expansion factor (BEF) for some species, for the category forest land remaining forest land in the LULUCF sector.

18. Recommendations from previous reviews that have not yet been implemented, as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 9 below.

B. Energy

1. Sector overview

19. The energy sector is the main sector in the GHG inventory of Slovakia. In 2012, emissions from the energy sector amounted to 29,534.03 Gg CO_2 eq, or 68.5 per cent of total GHG emissions. Since 1990, emissions have decreased by 47.0 per cent. The key drivers for the fall in emissions were: switching fuel use from coal and oil to natural gas; market-driven changes such as the removal of price subsidies for electricity production; economic restructuring towards less-energy-intensive production (mostly after Slovakia became a member State of the European Union (EU)); and the adoption of national legislation on air quality aimed at the reduction of emissions of common air pollutants. Within the sector, 32.3 per cent of the emissions were from energy industries, followed by 24.5 per cent from manufacturing industries and construction, 22.3 per cent from transport, 13.8 per cent from other sectors and 3.5 per cent from other (fuel combustion). Fugitive emissions from oil and natural gas accounted for 2.6 per cent and fugitive emissions from solid fuels accounted for 1.1 per cent.

20. Slovakia has made recalculations between the 2013 and 2014 annual submissions for this sector. The recalculations were made in response to recommendations made in the previous annual review report, and aimed to improve the material balance of refinery gases and liquid fuels. The most significant recalculations made by Slovakia between the 2013 and 2014 annual submissions were in the following subcategories: petroleum refining and chemicals. The ERT commends Slovakia for its efforts to improve the quality of the data. Compared with the 2013 annual submission, the recalculations decreased emissions in the energy sector by 118.62 Gg CO_2 eq (0.4 per cent), and decreased total national emissions by 0.3 per cent. However, the recalculations were not adequately explained. In response to questions raised by the ERT during the review, Slovakia did not provide sufficient detailed evidence to explain the recalculations, especially supporting information to explain the large reduction in reported emissions from the subcategory manufacturing industries and

construction – chemicals (liquid fuels). The ERT recommends that Slovakia provide a much more detailed fuel-specific breakdown of the AD and EFs used to generate emission estimates for the sectors petroleum refining and chemicals in its next submission.

21. The ERT noted that Slovakia could improve the transparency of its reporting of the information on the national energy balance in the NIR. The ERT reiterates the recommendation made in the previous review report that Slovakia provide a brief summary of the national energy balance in the NIR. For that purpose, the ERT encourages Slovakia to consider summarizing the energy balance table, for publication in the NIR.

2. Reference and sectoral approaches

22. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 23–28 below.

Table 5
Review of reference and sectoral approaches

Issue	*Expert review team assessment*	*Paragraph cross references*
Difference between the reference approach and the sectoral approach	Energy consumption: –18.23 PJ, –4.83% CO_2 emissions: –856.57 Gg CO_2, –3.05%	23
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	No	23
Are differences with international statistics adequately explained?	No	25
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	No	26
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	No	27, 28

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

23. CO_2 emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For the year 2012, there is a difference of –7.99 per cent in the CO_2 emission estimates for liquid fuels and –12.79 per cent for liquid fuel consumption between the reference and the sectoral approaches: the higher estimates were calculated using the reference approach. The reasons behind this difference are not discussed in the NIR. The ERT recommends that Slovakia provide more detailed explanations of the difference between CO_2 emissions calculated using the sectoral approach with those calculated using the reference approach. The average disparity for liquid fuels is –13.2 per cent across the time series. While recognizing the improvements made, the ERT recommends that Slovakia improve the consistency of its reporting and resolve the discrepancies among the three sources of AD for the reference approach. In addition, the

ERT recommends that Slovakia conduct more detailed analysis of the causes behind the discrepancies between the reference and the sectoral approaches for each individual liquid fuel type and provide the numerical data obtained as a result of such an analysis in its next NIR.

24. The ERT commends Slovakia for its work towards the harmonization of data between the National Emission Information System (NEIS) and the national energy statistics (NES). The ERT reiterates the recommendation made in previous review reports that Slovakia work closely with the Statistical Office of the Slovak Republic to examine and reduce these significant discrepancies, implementing actions towards the harmonization of data and ensuring that the NEIS data coverage is fully consistent with the NES. The ERT also reiterates the recommendation made in the previous review report that Slovakia provide adequate and complete explanations in the NIR for any changes undertaken. The ERT further reiterates the recommendation made in the previous review report that Slovakia include in the NIR a table presenting a comparison, by fuel type, of fuel consumption data from the NEIS database and from the national statistics.

25. The ERT identified some inconsistencies between the information provided in the CRF tables and information submitted to the International Energy Agency (IEA). For example, the total apparent consumption reported to the UNFCCC by Slovakia corresponds with that reported to the IEA, with discrepancies within 3.0 per cent for all years except 1990 and 1991, where the data in the CRF tables are approximately 5.0 per cent higher than those of the IEA. The growth rate in the period 1990–2012 for the total apparent consumption is 39.0 per cent in the CRF tables compared with 36.0 per cent in the IEA data. In addition, from 2001 onwards, production of additives is reported to the IEA, although the Party has explained that additives contain water and biofuel which are reported to the UNFCCC under biofuels. The ERT recommends that Slovakia provide a more detailed description of these additives. The ERT reiterates the recommendation made in the previous review report that Slovakia increase the transparency of its NIR by explaining any discrepancies between the apparent consumption data reported in its inventory to the UNFCCC, the data from the energy balance of the Statistical Office of the Slovak Republic and the data reported to IEA.

International bunker fuels

26. In response to recommendations made in previous review reports, Slovakia has provided in the NIR some information and explanations regarding the expert judgement used for the emission estimates for aviation bunkers. This expert judgement relates to the consumption of jet kerosene in the period 1990–2008, which assumes that the international aviation bunker represents 90.0 per cent on average of the total consumption at Slovak airports (domestic and international flights), while for the period 2009–2010 this share increased to 95.0 per cent on average. Across the entire time series for aviation gasoline, Slovakia assumes that 10.0 per cent of the fuel sold at airports is used for international flights. During the review, Slovakia informed the ERT that the EUROCONTROL methodology for international bunkers is not consistent with the national methodology, but assured the ERT that the European Union Emissions Trading System (EU ETS) is in agreement with the Party's CO_2 emission estimation for domestic aviation. The ERT recommends that Slovakia provide this information in the NIR and further reiterates the recommendation made in the previous review report that Slovakia investigate the representativeness of the assumed time-trends of fuel consumption share between aviation and the international bunker throughout the entire time series.

Feedstocks and non-energy use of fuels

27. Liquid fuels (ethane, gas oil, liquefied petroleum gas (LPG), naphtha and other fuels), solid fuels (coking coal) and natural gas are used as feedstocks in Slovakia. In

addition, other non-energy use is associated with bitumen and lubricants. During the review, in response to questions raised, Slovakia informed the ERT that there is a systematic error in the estimation of stored carbon. The Party also informed the ERT of its intention to implement a completely new methodology for carbon stored in its next submission to eliminate these errors. The ERT welcomes this development, and recommends that Slovakia thoroughly review the feedstocks and non-energy use of fuels, clearly describe the new methodology and indicate how the stored fraction of carbon is reported in the sectoral approach in the NIR of its next annual submission.

28. The ERT notes that in the reporting of recalculations of emissions from ammonia production (see para. 42 below) and in the reporting of non-energy use of fuels used as reductants (see paras. 47 and 48 below), there is an inconsistency in the preparation of the emission estimates for both the energy and industrial processes sectors. In response to questions raised by the ERT during the review, Slovakia indicated that a new working group on energy has been established and that a new energy sector coordinator has been appointed and will be responsible for the QA/QC of the energy sector in future submissions. The ERT welcomes these developments in the inventory management structure and encourages Slovakia to use the working group on energy and the coordinator to improve communications across the inventory agency. Furthermore, the ERT recommends that Slovakia establish new QA/QC routines to govern fuel AD across the inventory, and implement specific AD quality checks to compare the NES data against the sum of AD in the energy and industrial processes sectors for all commodities used as fuels, feedstocks, reductants and other non-energy uses (e.g. natural gas, coke, petroleum coke, lubricants).

3. Key categories

Stationary combustion: liquid, solid and gaseous fuels – CO_2, CH_4 and N_2O[4]

29. For petroleum refining, Slovakia developed a new methodology based on updated data obtained directly from the refinery company, allowing the estimation of the carbon flows associated with the production, recycling and consumption of petroleum-derived fuels under this subcategory. Data prior to 2005 have been extrapolated back to 1990 using a country-specific methodology based on crude oil consumption, and gasoline and diesel production. As part of this new approach, the energy plant previously reported under manufacture of solid fuels and other energy industries (1.A.2.C) was reallocated to petroleum refining (1.A.1.B). The consumption of natural gas, which may be used as a fuel for heating and as a feedstock to produce hydrogen for use in the oil refinery cracking processes, has also been revised. Petroleum coke has been re-categorized from solid fuels to liquid fuels. However, the NIR lacks transparency regarding the description of the recalculations. In response to a question raised by the ERT during the review, Slovakia provided further explanations and data, but these were insufficient to allow the ERT to understand and verify the estimation and allocation of the associated emissions. The ERT commends Slovakia for the effort it has made to improve the quality of the emission estimates under petroleum refining. The ERT recommends that Slovakia improve transparency regarding the description of the methodology used for estimating emissions from petroleum refining and the estimation and allocation of the associated emissions in the NIR of its next annual submission.

30. Slovakia submitted recalculated emission estimates for the entire time series for liquid fuel combustion under chemical industry and also under petroleum refining, leading

[4] Not all emissions related to all gases under this category are key categories. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

to a reduction in GHG emissions of over 850 Gg CO_2 eq in 2011 in the 2014 submission. In response to questions raised by the ERT during the review, Slovakia explained that the recalculations are part of an ongoing inventory improvement programme to reconcile data across different datasets: NEIS, NES and the EU ETS. The ERT commends Slovakia for its efforts to improve the accuracy of the inventory. However, Slovakia did not provide sufficient details of the recalculations for individual fuels to justify the change in CO_2 emissions observed due to the recalculations for liquid fuels. This issue was included in the list of potential problems and further questions raised by the ERT.

31. In response to the list of potential problems and further questions raised by the ERT, Slovakia provided further information and data to explain the recalculations, and submitted revised estimates, which were accepted by the ERT. The ERT notes that, owing to the combination of fuel reallocations between IPCC fuel categories and revisions to fuel AD that led to the recalculations, the revised estimates increased emissions from gaseous fuels under petroleum refining by 7 per cent (45.98 Gg CO_2 eq) for the year 2012. The ERT recommends that Slovakia include in the NIR the detailed explanations of the methodological choices and recalculations provided during the review, in order to increase the transparency of recalculations in future submissions.

32. Currently, the NIR provides only a limited commentary to explain the use of the NEIS dataset in preference to the NES one. For the next submission, the ERT encourages Slovakia to analyse and explain the discrepancies between the NES and NEIS AD for all fuels, and present clear evidence that the national inventory method and AD selection ensure completeness and minimizes uncertainty. The ERT also encourages Slovakia to add information to the NIR detailing how the NES natural gas balance is compiled by the Statistical Office of the Slovak Republic, and the uncertainty associated with it. Furthermore, the ERT encourages Slovakia to calculate and present a comparison of the uncertainty of the natural gas balance totals derived from the NES and the NEIS.

33. For the category feedstocks and non-energy use of fuel, Slovakia reported that for LPG, ethane and naphtha the fraction of carbon stored in 2012 was 80 per cent and that the carbon stored is associated with chemicals (under manufacturing industries and construction). However, the CO_2 emissions reported under manufacturing industries and construction – chemicals (liquid fuels) in 2012 (14.78 Gg CO_2) are insufficient to account for emissions from 20 per cent of the feedstock consumed. In response to questions raised during the review, Slovakia indicated that the national GHG inventory totals are based on bottom-up data reporting from the NEIS, while the reference approach data are estimated using a top-down national energy balance, from the NES. Slovakia did not provide sufficient information to confirm the inclusion of emissions from combustion of LPG, ethane and naphtha within the national inventory, and the ERT considered this a potential underestimation of emissions and included it in the list of potential problems and further questions raised by the ERT.

34. In response to the list of potential problems and further questions raised by the ERT, Slovakia provided further information to clarify that there is only one petrochemical production plant in Slovakia where these feedstocks are used, and that the emissions are reported in the national inventory under petroleum refining. Slovakia also provided additional data on feedstock use and petrochemical production data reported by the operator and to EUROSTAT. These datasets show close alignment, and the ERT's calculations using a carbon balance approach also show close consistency with data reported by EU ETS and national inventory totals. Therefore, the ERT considers that the problem identified during the review is resolved (i.e. that the national inventory submission is complete while the reference approach carbon stored fractions are incorrect). The ERT recommends that Slovakia review the reference approach allocations of carbon excluded from petrochemical feedstock use in the next submission.

35. For combustion of solid fuels in the sectors commercial, residential and agriculture/forestry/fisheries, Slovakia has used a CH_4 EF of 1.0 kg CH_4/TJ when the IPCC default EF for the commercial sector is 10.0 kg CH_4/TJ and for the residential and agriculture/forestry/fisheries sectors is 300.0 kg CH_4/TJ. In addition, for combustion of biomass in the residential sector, the Party has used a CH_4 EF of 30.0 kg CH_4/TJ when the IPCC default EF is 300.0 kg CH_4/TJ. Slovakia has not provided sufficient justification and supporting evidence for the use of lower CH_4 EFs. Slovakia assumes that all commercial, residential and agriculture/forestry/fisheries sources are comparable with larger industry sources, though this has not been substantiated. The ERT considered this a potential underestimation of emissions and included it in the list of potential problems and further questions raised by the ERT.

36. In response to the list of potential problems and further questions raised by the ERT, Slovakia submitted revised estimates using the IPCC default EFs. The problem identified during the review was considered resolved by the ERT. The new estimates of emissions from combustion of solid fuels and biomass in the commercial, residential and agriculture/forestry/fisheries sectors increased the national total by 145.96 Gg CO_2 eq (0.3 per cent).

37. The CO_2 EF for natural gas from 1990 to 1999 has been estimated using backwards regression analysis of the 2000–2005 trend based on a recommendation made in the previous review report. Without supporting evidence for such a high EF in 1990, the ERT considers that such an extrapolation of EFs is inappropriate. A more appropriate method would be to use a simple linear regression. The ERT recommends that Slovakia review and analyse the CO_2 EF extrapolation methodology and if still justified provide supporting evidence, otherwise revise the CO_2 EF extrapolation methodology and report the details in its next submission.

4. Non-key categories

Other stationary: liquid fuels – CO_2, CH_4 and N_2O

38. In its 2014 submission, Slovakia did not report any GHG emissions from the combustion of lubricants in the sectoral approach for any year of the time series, but did report a carbon stored fraction of 50 per cent in the reference approach and in CRF table 1.A(d). In response to questions raised during the review, Slovakia indicated that the national GHG inventory totals are based on bottom-up data reporting from the NEIS, while the reference approach data are estimated using a top-down national energy balance. Slovakia did not provide sufficient information to confirm the inclusion of emissions from combustion of lubricants within the national inventory. The ERT considered this a potential underestimation of emissions and included it in the list of potential problems and further questions raised by the ERT.

39. In response to the list of potential problems and further questions raised by the ERT, Slovakia submitted revised estimates. The problem identified during the review was considered resolved by the ERT. The new estimates of emissions within the category other fuel combustion, liquid fuels, increased the national total by 68.18 Gg CO_2 eq (0.2 per cent).

Coal mining and handling: solid fuels – CO_2

40. As noted in previous review reports, Slovakia continues to report CO_2 emissions from coal mining and handling as "NO" (not occurring) although coal mines do occur in the country. In response to a recommendation made in previous review reports, Slovakia has provided an explanation in the NIR, namely that the volume of CO_2 in fugitive gases from mined coal is below a measurement detection threshold, thereby justifying the use of the notation key "NO". The current ERT commends Slovakia for this improvement in transparency and recognizes that there are no specific methods for estimating fugitive CO_2

emissions from coal mines in the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). However, the ERT further notes that there are no thresholds below which emissions from categories do not have to be reported and therefore reiterates the previous recommendation that Slovakia change the notation key from "NO" to "NE" (not estimated).

C. Industrial processes and solvent and other product use

1. Sector overview

41. In 2012, emissions from the industrial processes sector amounted to 7,993.52 Gg CO_2 eq, or 18.5 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 172.93 Gg CO_2 eq, or 0.4 per cent of total GHG emissions. Since 1990, emissions have decreased by 12.9 per cent in the industrial processes sector, and increased by 17.5 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector are decreases in the production of cement, lime and metals since 1990 and also the increase in emission abatement technologies in industries such as nitric acid production, where N_2O emissions have reduced significantly over the period. Within the industrial processes sector, 51.2 per cent of the emissions were from metal production, followed by 31.0 per cent from mineral products and 11.9 per cent from chemical industry. The remaining 5.9 per cent were from consumption of halocarbons and SF_6. Emissions from other production, other industrial processes and the production of halocarbons and SF_6 are reported as "NA" (not applicable) and "NO". The increase in emissions from the solvent and other product use sector is mainly due to an increase in N_2O emissions from aerosol cans.

42. Slovakia has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. The most significant recalculation made by Slovakia between the 2013 and 2014 annual submissions was in the following category: ammonia production. The recalculation was made in order to rectify identified errors of double counting of AD for natural gas between the energy and industrial processes sectors. Compared with the 2013 annual submission, the recalculation decreased emissions in the industrial processes sector by 190.51 Gg CO_2 eq (2.3 per cent), and decreased Slovakia's total national emissions by 0.4 per cent. The recalculation was not adequately explained in the NIR because the overall impacts to natural gas AD were not presented. In response to questions raised by the ERT during the review, Slovakia explained the source of the double counting and provided the demand-side sector breakdown of the natural gas energy balance from the 2013 and 2014 submissions. To improve transparency, the ERT recommends that Slovakia include more detailed information on recalculations in future NIRs, such as that provided during the review (e.g. tables of AD and EFs for each source and activity, and any additional parameters or assumptions) highlighting all changes since the previous submission.

43. The inventory is complete for the industrial processes sector and the AD, EFs and methodologies used are consistent with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the IPCC good practice guidance. Emission estimates are based predominantly on tier 2 or tier 3 methodologies, including estimates of CO_2 from cement, lime and ammonia production using plant-specific data. In these and other source categories, the inventory exhibits a high degree of source-specific quality checks (e.g. comparing inventory emissions against EU ETS data, and comparing aggregated installation-level AD against published national statistics). The ERT commends Slovakia for its implementation of higher-tier methods and detailed quality checking procedures, which have improved the

accuracy of the national inventory and provide evidence of the completeness of the inventory.

44. The ERT notes, however, that the NIR does not provide a clear description of the estimation methods and the QA/QC procedures for all source categories, undermining the quality of the inventory due to insufficient transparency. The ERT recommends that Slovakia continue to improve the transparency of the NIR, adding details that were provided during the review, for example to clarify national inventory data sources, data flows between organizations (companies, regulators, inventory agency) and cross-checks with data reported to other systems (such as between the NEIS, NES and EU ETS). The ERT also recommends that Slovakia systematically review and improve the NIR, ensuring that, for each source category, all method details (including source data – AD and EFs, assumptions, extrapolation methods and recalculations – and QA/QC procedures) are clearly described and referenced. Furthermore, the ERT encourages the Party to extend its use of quantitative comparisons where appropriate for emissions data, AD and EFs and to explain any differences between inventory data and other national statistics. During the review, Slovakia provided information for several source categories to explain national trends in production, and to explain the derivation of (or extrapolation of) country-specific EFs applied across the time series. The ERT recommends that Slovakia include this information in the NIR (where possible and without releasing commercially sensitive data), including:

(a) Cement production: plant-specific clinker production data; the number of cement plants operating through the time series; clarification of the data source for the calcium oxide (CaO) content of clinker applied through the 1990s based on plant data from 2000–2003;

(b) Lime production: plant-specific lime production data; the number of lime plants operating within different industry sectors (within EU ETS, outside EU ETS in the sugar, paper and pulp sectors) through the time series; a summary of data sources, data gathering routines and quality checks against national statistics; and the source data available in 1990–2002 used to estimate the CaO and magnesium oxide (MgO) content of lime;

(c) Limestone and dolomite use: the number of sites using limestone and dolomite in different industry sectors (e.g. iron and steel, ceramics, desulphurization); summary of data sources, data gathering routines and quality checks against national statistics; and a quantitative comparison of inventory estimates compared with EU ETS data by installation and economic subsector;

(d) Magnesite production: clarification of the data gathering processes; the number of operating plants across the time series; details on the average national composition of magnesite clinker (CaO and MgO content) from 2001–2012; and the approach used to extrapolating data back to 1990.

45. The ERT noted that the use of notation keys in the industrial processes sector is appropriate in general, supporting the transparency of reporting. The ERT commends Slovakia for the improvements made since the previous submission. The ERT encourages the Party to continue to review and improve its use of notation keys and to provide supporting comments in the CRF tables to further improve transparency. For instance, in the reporting of emissions from the iron and steel sector, the NIR indicates that 20.82 ktonne of pig iron was produced and sold from the integrated works, but CRF table 2(I)A-Gs2 reports pig iron production as "NA". The ERT recommends that Slovakia address this inconsistency by correcting the notation key to "IE" (included elsewhere).

2. Key categories

Nitric acid production – N_2O

46. There are three nitric acid production plants in Slovakia: two medium-pressure plants and one high-pressure plant. In 2010, one of the medium-pressure plants and the high-pressure plant were fitted with new abatement technology to mitigate N_2O emissions, leading to a reduction in the reported emissions. The description of the method in the NIR indicates that plant-specific EFs were derived from monitoring trials at one of the medium-pressure plants during 2005–2010 and at the high-pressure plant during 2006–2007. The ERT considered that the information in the NIR was unclear regarding the methodology used to derive emission estimates following the addition of abatement technology in 2010, and the ERT requested further information to validate the reported decline in emissions across the time series. In response to questions raised by the ERT during the review, Slovakia clarified that continuous emission monitoring systems (CEMs) were used at two of the three plants to estimate emissions since 2010, and that a technology-specific EF was applied at the third plant across the time series. To improve the transparency of the NIR, the ERT recommends that Slovakia review and simplify the method description and provide clear references for all data sources used to inform EFs and AD (e.g. to include a table setting out the use of plant-specific EFs, technology-specific EFs, direct measurements using CEMs, for each plant across the time series), including the details provided to the ERT during the review.

Carbide production – CO_2

47. During the review the ERT noted that estimates reported for carbide production include emissions from: the decomposition of calcium carbonate; the use of reductant; and the use of non-exported carbide product. In response to questions raised by the ERT during the review, the Party provided clarifications that petroleum coke is the reductant used in Slovakia and provided the entire time series of AD for petroleum coke use. The ERT recommends that Slovakia add this information to future NIRs to improve the transparency of the method and to facilitate quality checking between data in the industrial processes sector and in the energy sector regarding the emissions from the non-energy use of fuels allocated under petroleum coke.

48. The ERT also notes that carbon stored from the use of petroleum coke is reported as "NO" in CRF table 1.A(b) and there is no reported activity or emissions for feedstocks and non-energy use of fuels allocated against petroleum coke in CRF table 1.A(d), despite its reported use as a reductant in carbide production. In response to a question raised by the ERT during the review, Slovakia acknowledged this reporting inconsistency. The ERT recommends that Slovakia strengthen its QA/QC activities regarding AD for commodities such as petroleum coke which are used as reductants in the industrial processes sector and are reported under non-energy use of fuels in the energy sector, and report on progress in its next submission.

Iron and steel production – CO_2

49. The ERT commends Slovakia for the improvements to the method description for this source category in the NIR, through the provision of detailed information and a schematic diagram in the NIR, annex 3. The ERT recommends that Slovakia further improve transparency and the description of the carbon balance method in the NIR by clarifying the scope (fuels, materials, source categories) of information presented in the flow diagram provided to the ERT during the review. Furthermore, the ERT recommends that Slovakia add in the NIR the comparison of the GHG inventory and EU ETS emission estimates for integrated steelworks, as provided to the ERT during the review, aggregated across all source categories used for the GHG inventory: coke production; iron and steel

combustion; other industrial production; limestone and dolomite use; and iron and steel production.

50. The ERT noted that Slovakia recalculated emission estimates for 1990–2004 following a review by the inventory agency of the method used to extrapolate back from operator-reported emission estimates from 2005 onwards. The recalculation was partially explained in the NIR but the ERT did not consider it sufficiently transparent. In response to a question raised by the ERT during the review, Slovakia clarified that the revised method applies a series of factors linked to four parameters available across the time series: steel production; pig iron sold; coke and coal used; and carbon in raw materials. This method has replaced a simpler extrapolation method that used only two parameters (steel production and pig iron sold), which was used in the 2013 submission. The ERT commends Slovakia for its efforts to improve the extrapolation method and recommends that Slovakia improve the transparency of recalculations in future NIRs by presenting a more detailed explanation of the changes to methods, assumptions, AD and EFs.

Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6

51. Slovakia introduced a new electronic reporting system in 2009 to gather country-specific data for fluorinated gases (F-gases) from certified operators and companies. Training has been provided for operators since the system inception, and the reporting scope and level of detail has been developed further in 2010 and 2012. The ERT noted that the NIR was not transparent regarding the approach to maintaining time-series consistency for the estimates of halocarbons and SF_6 following the introduction of the new reporting system and its subsequent evolution to generate more detailed data. In response to questions raised during the review, Slovakia clarified that new information provided following the system update in 2010 were used to generate revised estimates from 1990 onwards, and that data gathered from 2012 onwards on refrigerant use by source category will support the review of the disaggregation of source estimates. The ERT recommends that Slovakia include this useful clarification in the NIR and continue to review and improve the time series of emission estimates, using the reported data. Furthermore, the ERT recommends that the Party add to its NIR the details provided to the ERT during the review regarding the QA/QC activities applied to the halocarbons and SF_6 estimates in 2011.

3. Non-key categories

Other (mineral products) – CO_2

52. The method described in the NIR for estimating CO_2 emissions from glass production does not adequately explain the AD reference and scope, nor does it provide sufficient detail to understand the extrapolation method employed for the estimates from 1990 to 2003, where the NIR indicates that no AD on carbonate use are available. In response to questions raised by the ERT during the review, Slovakia provided clarifications on the number of sites operating through the time series and an explanation that the extrapolation prior to 2004 was based on plant-specific implied emission factors (IEFs) on CO_2 emissions per tonne of production by specific glass type. The Party also clarified that the detailed site-specific data are commercially sensitive and cannot be published in the NIR. The ERT acknowledges that this is the case and encourages the Party to prepare information for inspection by future ERTs that sets out the time series of IEFs and AD and the annual production by glass type that are used to derive the estimates of carbonate AD for the period 1990–2003.

D. Agriculture

1. Sector overview

53. In 2012, emissions from the agriculture sector amounted to 3,261.39 Gg CO_2 eq, or 7.6 per cent of total GHG emissions. Since 1990, emissions have decreased by 54.9 per cent. The key drivers for the fall in emissions are the reduction in livestock numbers, particularly cattle, and the restricted use of fertilizers. Within the sector, 56.7 per cent of the emissions were from agricultural soils, followed by 27.1 per cent from enteric fermentation. The remaining 16.3 per cent were from manure management. Emissions from rice cultivation, prescribed burning of savannahs and field burning of agricultural residues were reported as "NA" and "NO". Slovakia submitted a generally complete inventory for 1990–2012 in the agriculture sector. The ERT commends Slovakia for its continued efforts to strengthen the capacity and institutional arrangements for the agriculture sector, especially regarding the QC system.

54. Slovakia has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by Slovakia between the 2013 and 2014 annual submissions was for N_2O emissions from manure management, following the use of lower values of nitrogen excretion rates (Nex) for all reported animal categories for 2011 and 2012, except for poultry and horses. These changes contributed to a decrease of approximately 17 per cent in N_2O emissions from both solid and liquid manure management systems in 2011 and 2012. During the review, in response to a question raised by the ERT, Slovakia provided background information on the changes leading to the recalculations and the new Nex values used only for the 2011 and 2012 estimates. However, Slovakia did not provide background information on how the revised estimates were derived. The ERT recommends that Slovakia document the changes in the Nex values used, and report the revised N_2O emissions for the entire time series in its next annual submission.

2. Key categories

Enteric fermentation – CH_4

55. In response to a recommendation made in the previous review report, Slovakia has reported in the NIR that EFs for dairy cattle, non-dairy cattle and sheep are based on the average gross energy intake (GE) and other parameters specific to the country. Also, the Party provided in the NIR the overview of country-specific parameters used for dairy cattle in 2012 disaggregated by region (i.e. in eight districts). For dairy cattle, Slovakia reported the average animal weight, the percentage of pregnant animals and the feed digestibility fraction. For non-dairy cattle, Slovakia provided a detailed classification of animals including young males, young females, males and females aged 1–2 years, fattening cattle and bulls. However, the NIR does not contain a detailed explanation of how GE estimates were used, or the background information on the use of the average value of GE in the conditions of applying the tier 2 approach. The ERT recommends that Slovakia include in the NIR documentation on the use of country-specific data and the methodology used to estimate CH_4 emissions from enteric fermentation, especially an explanation about the regional differences and their implications on GE trends.

Manure management – N_2O and CH_4[5]

56. In the NIR, Slovakia presented the recalculated emissions of N_2O relating to Nex for 2011 and 2012, based on the requirements of Government Regulation No. 488/2010 Coll.

[5] CH_4 emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

The recalculation concerned all animal categories including dairy cattle, non-dairy cattle, pigs, sheep, goats, poultry and horses. A comparison of Nex rates used for the period 1990–2010 and the newly recalculated values used for 2011–2012 is provided in the NIR (table 6.13), which shows that the 2011 and 2012 data are significantly lower (e.g. dairy cattle 100 kg/head/year before 2011 and 88 kg/head/year in 2011 and 2012).

57. The ERT noted that annex 4 of Government Regulation No. 488/2010 Coll. provides the data on nitrogen (N) production from livestock using the same animal categories as those used in the inventory. These N data were based on the Ministry of Agriculture Decree no. 199/2008 Coll. Annex 7 of this decree regulates agricultural activities in areas designated as vulnerable zones by the Ministry of Agriculture. It is the opinion of the ERT that this decree regulates the N application to soil in nitrate-vulnerable zones and not the actual Nex for each type of animal. In addition, this decree regulates the amount of N applied to land after ammonia volatilization and does not take into account the increase in milk production and average GE intake of dairy cattle, which would result in the augmentation of Nex from dairy cattle. Thus, Slovakia has reported the amount of N applied to soil after ammonia volatilization from manure spreading, rather than from Nex. In response to a question raised by the ERT during the review, Slovakia informed the ERT that it has no data on the N intake from animal husbandry and no additional background information on the data in Government Regulation No. 488/2010 Coll.

58. The ERT considered that the inventory compiler has insufficient access to the relevant information on the process used for deriving data used in the inventory, and therefore cannot justify the values used in 2011 and 2012. Therefore, the ERT considers that the currently used Nex values were underestimated, which contributed to an underestimation of the N_2O emission from manure management. This underestimation also affected the inventory of N_2O emissions from agricultural soils, including: animal manure applied to soil; pasture, range and paddock manure; indirect emissions – atmospheric deposition; and indirect emissions – nitrogen leaching and run-off. This issue was included in the list of potential problems and further questions raised by the ERT.

59. In response to the list of potential problems and further questions raised by the ERT, Slovakia submitted revised estimates for N_2O emissions using default values for the Nex rates for all animals, consistent over the entire time series. The revised Nex values concerned all animal categories including dairy cattle, non-dairy cattle, pigs, sheep, goats, poultry and horses. In addition, Slovakia provided information on parameters for dairy cows indicating significant variations: from one region to another; from lowland to highland; and from high content of concentrate in fodder resulting in high milk productivity to more extensive breeding with low concentrate fodder and low milk productivity in mountainous regions. In this way, Slovakia justified the use of the value 100 kg N/head/year, as recommended for Western Europe countries in the Revised 1996 IPCC Guidelines, considering that exact data on the diets of dairy cows are not available. The revised estimates show an increase of around 17 per cent in N_2O emissions from manure management for 2011 and 2012 compared with the previously reported values. The ERT considers that the revised estimates resolved the issue and recommends that Slovakia prepare and report more thorough documentation on Nex for all animal categories in its next submission.

60. In table 6.10 of the 2014 NIR, Slovakia presented information on the EF values for dairy and non-dairy cattle (12.3–12.9 kg/head/year and 4.0–4.1 kg/head/year, respectively) in response to a recommendation made in the previous review report. The current ERT noted that these IEFs are derived from country-specific data and are higher than the IPCC default values for Eastern Europe (6 kg/head/year and 4 kg/head/year, respectively). The ERT also noted that the country-specific CH_4 EFs for dairy and non-dairy cattle for manure management were based and calculated in a manner consistent with the tier 2 method for

enteric fermentation using country and regionally specific input parameters available since 2005, and were not based on expert judgement values, as reported in the 2013 NIR. The current ERT commends Slovakia for its efforts in implementing the CH_4 EF values for dairy and non-dairy cattle and in conducting the recalculations for the entire time series, in response to the recommendation made in the previous review report.

Agriculture soils – N_2O

61. Slovakia reported in its NIR the methodology for estimating N_2O emissions in agriculture soils from N-fixing crops, stating that there are "enough reasons to accept an experimental value of 26 kg N/ha" without providing any further details. This issue had already been raised by the previous ERT as not providing sufficient documentation to support the country-specific value because cropping area and the composition in terms of N-fixing crops has changed since the time when the experimental value was determined. In addition, the current ERT noted that the methodology used by Slovakia does not include the default value provided in the Revised 1996 IPCC Guidelines (table 4-7 and equation 5), which is related to the total production and not the area. In response to a question raised by the ERT during the review, Slovakia provided a document containing the values of N and explained that the methodology for the calculation of both N-fixing crops and crop residues is based on the measured and verified values of the nutritional potential of residual crops in soil. Moreover, the Party explained that the value of 26 kg N/ha is an average value for biological fixation and was not used in the calculation of emissions. The ERT reviewed the references provided by Slovakia and confirmed that the methodology is accurate. However, in order to improve transparency regarding the estimation of N_2O emissions from this category, the ERT reiterates the recommendation made in the previous review report that Slovakia explain its country-specific methodology in the NIR, especially with regard to the calculation of emissions from N-fixing crops and crop residues.

62. The ERT noticed during the review that the N_2O emissions from agricultural soils (including: animal manure applied to soil; pasture, range and paddock manure; indirect emissions – atmospheric deposition; and indirect emissions – nitrogen leaching and run-off) are underestimated because of the underestimation of the Nex for all reported animal categories (see para. 58). The ERT included this issue in the list of potential problems and further questions raised and requested Slovakia to revise the N_2O emissions from agricultural soils in a manner consistent with the revision of the Nex values following the resolution of the issues identified for the category manure management, and submit the revised estimates.

63. In response to the list of potential problems and further questions raised by the ERT, Slovakia submitted revised estimates using default values for the Nex rates for all animals consistently over the entire time series. The recalculations were provided for all animals and for all the recommended types of animal waste management systems. Slovakia also reported on the difficulties faced by animal nutrition experts in providing data on the protein content of the animal feed for the representative sample of farms in Slovakia, considering its direct relation to farm and agricultural practices. The ERT accepted the revised estimates for N_2O emissions from agricultural soils and recommends that Slovakia estimate N_2O emissions from agricultural soils considering the revised values of the Nex used in the category manure management.

E. Land use, land-use change and forestry

1. Sector overview

64. In 2012, net removals from the LULUCF sector amounted to 8,102.83 Gg CO_2 eq. Since 1990, net removals have decreased by 10.1 per cent. The key driver for the removals

was natural disturbance events (storms in 2004), which resulted in increased salvage harvesting. Within the sector, 7,207.30 Gg CO_2 eq of net removals were from forest land, followed by 864.97 Gg CO_2 eq from cropland and 232.50 Gg CO_2 eq from grassland. Net emissions were reported from other land (105.83 Gg CO_2 eq) and settlements (96.11 Gg CO_2 eq). Emissions and removals from wetlands were reported as "NO".

65. Slovakia has made recalculations for the LULUCF sector between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by Slovakia between the 2013 and 2014 annual submission was in the category forest land remaining forest land. The recalculation was made in response to the 2013 annual review report following changes in EFs: the fraction of biomass left to decay in forest changed from 0.1 to 0 and the BEF for breeding poplars and willows changed from 0.95 to 1.28 for forest land remaining forest land; and the correction of annual changes of soil carbon stock due to land-use changes. Compared with the 2013 annual submission, the recalculations decreased removals in the LULUCF sector by 1263.80 Gg CO_2 eq (16.9 per cent). The recalculations were adequately explained.

66. Slovakia's submission in 2014 for the LULUCF sector is complete. However, the ERT noted that some carbon pools for which reporting is mandatory were reported as "NO" following a tier 1 approach (e.g. dead organic matter and soil organic matter in forest land remaining forest land, and living biomass and soil organic matter in grassland remaining grassland), due to insufficient data available to apply a tier 2 approach. The ERT reiterates the recommendation made in the previous review report that Slovakia continue the ongoing technical research (the "Assessment and modelling of carbon stocks in forest ecosystems for GHG inventory in landscape", known as the C-FORLAND project) in order to provide reliable data for estimating carbon stock changes in living biomass, dead organic matter and soil organic matter in its next annual submission.

67. In estimating the annual increment in biomass carbon stock for forest land remaining forest, Slovakia used country-specific values of wood density for each species (NIR table 7.6). In addition, Slovakia used biomass conversion and expansion factors (BCEFs) (NIR pages 257, 268, 272, 275, 278 and 335) for estimating the annual biomass carbon loss due to commercial felling under forest land remaining forest land and carbon stock changes in living biomass under forest land converted to other land-use categories (e.g. cropland, grassland, settlements and other land). However, the method for deriving aggregated BCEF values was not transparently described in the NIR. The existing description in the NIR infers that the IPCC default values of wood density were used for deriving aggregated BCEF values, namely 0.40, 0.42 and 0.58 t/m^3 for spruce, pine, beech and oak, respectively (NIR, page 257). In response to a question raised by the ERT during the review, Slovakia explained that the calculation of BCEFs was part of the international MASCAREF project which provided BCEF values for each age class for spruce, pine, beech and oak. The BCEF values of each species are the arithmetic mean of different age classes. The ERT considers that the BCEF values should be derived as the weighted mean of different age classes, and notes that the mean BCEF value changes from year to year due to changes in age class structure and species composition. The ERT recommends that Slovakia, in its next annual submission: use consistently EFs (e.g. BCEF) for estimating carbon gain, loss and/or stock changes in living biomass for forest land and forest land converted to other land-use categories; derive time-series weighted mean BCEF values for each species based on age class structure and species composition; and provide in its NIR detailed background data and a clear description of the procedure for calculating the time-series weighted mean BCEF values.

68. Slovakia has reported the use of default biomass carbon stocks removed owing to conversion to grassland, settlement and other land from annual cropland (5.0 tonnes carbon (C)/ha) in its NIR. The ERT considers that the cropland converted could include not only

annual crops but also perennial woody crops. During the review, in response to questions raised by the ERT, Slovakia explained that the current data structure does not allow the estimation of the part of perennial woody cropland that is converted. For this reason, Slovakia considers all converted croplands as annual crops. The ERT reiterates the recommendation made in the previous review report that Slovakia use default carbon stock values before conversion not only for the annual crops but also for the perennial woody crops, in accordance with the table 3.3.2 of the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF), for carbon stocks in a range of climate regions for generic perennial woody cropland and considering the area converted from annual crops and perennial woody crops, respectively.

69. Slovakia reported carbon stock changes in dead wood for forest land converted to other land-use categories (cropland, grassland, settlements and other land) using a tier 1 method and provided background information. However, the country-specific value of dead wood in forest land before conversion was not provided in the NIR. In response to a question raised by the ERT during the review, Slovakia explained that the average carbon stock of dead wood per hectare (ha) in forest land is 4.878 t. The ERT recommends that Slovakia include such information in the NIR of its next annual submission.

70. Slovakia reported carbon stock changes in litter for forest land converted to other land-use categories (cropland, grassland, settlements and other land) assuming litter decomposes linearly in 20 years after conversion. The ERT considers that this assumption is not conservative, and instead the instant oxidation (all carbon in litter emitted to the atmosphere in the year of conversion) should be assumed. The ERT recommends that Slovakia apply the instant oxidation for carbon stock changes in litter for forest land converted to other land-use categories in the next annual submission.

71. Slovakia reported net carbon stock changes in mineral soils using a tier 2 method and country-specific mean values of carbon stocks in mineral soils for each land-use category. The ERT noted that the process of estimating the mean value of soil carbon stocks is not clearly and transparently described in the NIR. In response to a question raised by the ERT during the current review, the Party provided a publication, in Slovak, with a brief abstract in English. The ERT reiterates the recommendation made in the previous review report that Slovakia improve the transparency of its reporting by providing a clear description of the process used to estimate the mean value of soil organic carbon stocks in each land-use category and refer to the original data source (e.g. number of sample plots for each land-use category and the geographical structure of soil types at the country level).

72. Slovakia has conducted a tier 1 uncertainty analysis using default values on uncertainty from the IPCC good practice guidance for LULUCF. The ERT strongly reiterates the recommendation made in previous review reports that the Party conduct the tier 1 uncertainty analyses at the land-use subcategory level. The ERT also recommends that Slovakia continue the technical work to increase the transparency of its reporting by providing, in its next annual submission, country-specific uncertainty values at the land-use subcategory level for a tier 2 uncertainty analysis.

2. Key categories

Forest land remaining forest land – CO_2

73. Slovakia has reported in its NIR (chapter 7.7.2) that the annual harvest volume (H) is collected and elaborated by the National Forest Centre – Institute for Forest Resources and Information (NFC-IFRI Zvolen) (forest management plan database administrator), on the basis of about 9,000 respondents (forest owners). It represents 90–95 per cent of annual harvest data and covers thinning and final cut. In response to questions raised by the ERT

during the previous review concerning the "5–10 per cent of annual harvest data", Slovakia confirmed that, after repeated consultation with experts from NFC-IFRI Zvolen, the annual reported harvest data cover the whole biomass harvested including all the largest forest companies, forest owners or users in Slovakia's forests during the reported year. Slovakia added that even the stolen timber is notified by owners and it is included in the annual harvest data each year. All subjects (users, companies), whether or not they are involved in harvesting, have to inform NFC-IFRI Zvolen, in accordance with the statutory duty (Act No. 326/2005 on forests) about the amount and type of harvest.

74. Slovakia used the BEF method to estimate annual above-ground biomass increment and the BCEF approach to estimate the biomass loss due to felling in forest land remaining forest land. The ERT recommends that Slovakia apply consistent methods for the biomass increment and loss in the next annual submission.

Cropland remaining cropland – CO_2

75. Slovakia applied a tier 1 method to estimate carbon stock changes in cropland remaining cropland. The ERT noted that cropland in Slovakia includes annual cropland and perennial woody cropland, and that the carbon stock changes due to the conversion between annual cropland and perennial woody cropland were not reported. In response to a question raised by the ERT during the review, Slovakia explained that net carbon stock changes in living biomass, especially in perennial woody crops were estimated. Given that the annual cropland and woody cropland may have significantly different carbon stocks and that this category is a key category, the ERT recommends that Slovakia estimate and report the carbon stock changes by disaggregating this category into annual cropland converted to perennial woody cropland and perennial woody cropland converted to annual cropland in the next annual submission.

76. The AD for this category steadily decreased in the reporting period, but the carbon stock changes have inter-annual variations. In response to a question raised by the ERT during the review, Slovakia explained that the inter-annual spikes in the removals from cropland remaining cropland are caused by living biomass as a result of the use of the default carbon stock of perennial cropland (63 t/ha) and inter-annual changes of area with biomass losses. The ERT recommends that Slovakia include this explanation in the NIR of its next annual submission.

77. There are some histosols in Slovakia, as described in the NIR. However, organic soil was reported as "NO". In response to a question raised by the ERT during the review, Slovakia explained that histosols are in localities that are under state nature protection, so there is no management (no activities to drain these soil and no other activities that could influence carbon stock in histosols). The ERT recommends that Slovakia include this explanation in its NIR.

Land converted to grassland – CO_2

78. The ERT noted that the trend of carbon stock changes for land converted to grassland is not stable and significant inter-annual changes have been identified. The information provided in the NIR (figure 7.22) is not sufficient for the ERT to understand the spikes occurring in 1992 (1250.85 Gg CO_2), 2000 (735.93 Gg CO_2) and 2001 (729.18 Gg CO_2). During the review, in response to questions raised by the ERT, Slovakia explained that the spikes are mainly related to living biomass owing to an increase of the area of cropland converted to grassland. The ERT reiterates the recommendation made in the previous review report that Slovakia include this explanation in its next annual submission.

3. Non-key categories

Direct N_2O emissions from N fertilization of forest land and other – N_2O

79. The Party has not provided in its NIR information to support its assumption that N fertilization in forests is not practised in Slovakia. In response to a question raised during the review, Slovakia clarified that some experiments with N fertilization of forests were carried out in the past, but these did not result in the expected effects in view of the high costs. The ERT reiterates the recommendation made in the previous review report that Slovakia provide these explanations and evidence in its NIR.

CO_2 emissions from agricultural lime application – CO_2

80. The Party has not provided in its NIR information to support its assumption that lime application in forests is not practised in Slovakia. In response to a question raised during the review, Slovakia clarified that the status of base cations, soil acidity and sensitivity to soil acidification is rather good in Slovakia. Very acid soils are only found in the upper parts of mountains (most of which are included in national parks) and in some regions that are affected by intensive acid atmospheric deposition, where forests were limed in the 1980s, but where, because of the relatively coarse particle size of ground lime, the effects were very limited. No liming is allowed without a specific authorized project. On the basis of these results, Slovakia concluded that liming does not occur as a management practice for forests. The ERT reiterates the recommendation made in the previous review report that Slovakia provide these explanations and evidence in its NIR.

F. Waste

1. Sector overview

81. In 2012, emissions from the waste sector amounted to 2,156.47 Gg CO_2 eq, or 5.0 per cent of total GHG emissions. Since 1990, emissions have increased by 57.1 per cent. The key driver for the rise in emissions is the introduction of a more exact methodology for the evaluation of CH_4 emissions from solid waste disposal sites. Within the sector, 75.6 per cent of the emissions were from solid waste disposal on land, followed by 17.0 per cent from wastewater handling. Other (waste) accounted for 7.0 per cent and the remaining 0.5 per cent was from waste incineration.

82. Slovakia has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by Slovakia between the 2013 and 2014 annual submissions was in the category wastewater handling. The recalculations were made in AD and EFs, and in order to rectify identified errors. Compared with the 2013 annual submission, the recalculations decreased emissions in the waste sector by 61.34 Gg CO_2 eq (2.8 per cent) and decreased total national emissions by 0.1 per cent. The recalculations were adequately explained and the ERT notes that Slovakia also plans to review the AD in detail, removing outliers and replacing them with interpolations/extrapolations in its next submission. The ERT commends Slovakia for this action to improve accuracy.

83. The ERT commends Slovakia for using the IPCC tier 2 first-order decay method to estimate CH_4 emissions for solid waste disposal sites and encourages Slovakia to develop country-specific EFs and AD for the waste sector. However, the information provided in the waste sector is not sufficiently transparent, especially on methodological issues. Slovakia does not provide in the NIR details of the step-by-step approach used for the estimation of emissions from the waste sector. In addition, the recommendation made in the previous review report that Slovakia estimate emissions from the period 1990–1996 using the interpolation method for industrial and agricultural waste composition (including the

justification that gases leaving anaerobic stabilization are considered as a source of emissions according to air pollution control) was not implemented. The ERT reiterates the recommendation made in the previous review report that Slovakia include this information in its next annual submission.

2. Key categories

Solid waste disposal on land – CH_4

84. Slovakia used the IPCC tier 2 first-order decay method to estimate CH_4 emissions from solid waste disposal sites. The ERT identified two outliers for total waste emissions (2,024.18 Gg CO_2 eq) for 1999 and total emissions from solid waste disposal on land (919.80 Gg CO_2 eq) for 1997. In response to a question raised by the ERT during the review regarding outliers, Slovakia explained that this is caused by inter-annual fluctuations in emissions from agricultural and industrial waste. However, the ERT considered that this information is not transparent because the category description provided in the NIR discusses industrial waste and does not explain agricultural waste, which is driving the inter-annual fluctuations in emissions from solid waste disposal on land. The ERT recommends that Slovakia provide more details on the fluctuation in emissions caused by agricultural activities.

85. Methodological issues on degradable organic carbon (DOC) described in the NIR indicate that the DOC value cannot be verified fully and the methodology used for municipal solid waste (MSW) composition analysis is not known. In response to a question raised by the ERT during the review regarding DOC values, Slovakia explained that the word "analysis" is a translation error and should be deleted. The ERT recommends that Slovakia correct the reporting error and verify MSW composition data for the entire time series to enhance transparency and consistency.

86. Slovakia calculated the emissions from the agricultural and industrial waste fractions using default values from the 2006 IPCC Guidelines. The Party justifies the use of these values based on the fact that the political, technological and economic changes that have affected the country since 1990 mean that applying the tier 1 approach from the IPCC good practice guidance would not be sufficiently accurate. CH_4 emissions for the period 1990–1996 were reported as equal as those of 1997 because before that year no data were available. Slovakia has indicated in the NIR that the extrapolation method was used for CH_4 emission estimates in the period 1990–1996; NIR table 8.14 provides data from 1997–2012 only. The ERT recommends that Slovakia estimate the emissions for the period 1990–1996 using an extrapolation method in accordance with the IPCC good practice guidance and report them in table 8.14 of the NIR.

87. Slovakia indicated in the NIR that "tier 0" methodology was used for estimating emissions. In response to a question raised by the ERT during the review regarding the use of "tier 0", Slovakia explained that this was a mistake and should be "tier 1" methodology which is still considered as the most appropriate method for the estimation of emissions from industrial waste disposal in solid waste disposal sites in Slovakia. The ERT encourages Slovakia to correct this error and strengthen its QA/QC procedures.

Wastewater handling – CH_4 and N_2O

88. Slovakia indicated in the NIR that the stabilization of sewage sludge is an integral part of wastewater treatment plants in Slovakia, and this process is carried out in sludge tanks under anaerobic conditions. In response to a question raised by the ERT during the previous review, Slovakia informed the ERT that all CH_4 is collected and flared and no CH_4 emissions result. The ERT reiterates the recommendation made in the previous review report that Slovakia include estimates of these emissions or provide documentation to show that these emissions do not occur, in the next submission.

89. As reported in its NIR, Slovakia uses the ISI methodology developed by Fraunhofer ISI (the Fraunhofer-Institut für Systemtechnik und Innovationsforschung) for estimating N_2O emissions from industrial wastewater. In response to a question raised by the ERT during the review regarding the ISI methodology, Slovakia explained that this methodology implies that, at wastewater treatment plants where there is no biological nitrification taking place, no N_2O emissions are generated. The Party also provided a reference to the methodology. The ERT recommends that Slovakia provide detailed information on the ISI methodology in its next submission to enhance transparency.

90. Slovakia reported "NE" for aggregated wastewater output and degradable organic component (DC) for industrial wastewater from 1990–2012 in CRF table 6.Bs2. In response to a question raised by the ERT during the review regarding the use of "NE" for wastewater output and DC, Slovakia explained that this is an incorrect use of the notation key because the values of wastewater outputs and DC are provided by disaggregated wastewater streams in the CRF tables. The ERT recommends that Slovakia correct the use of the notation key in its next annual submission and strengthen its QA/QC procedures to enhance transparency.

91. Slovakia reported in its NIR CH_4 emissions from industrial wastewater discharged into rivers by separate industrial sewers. The methodology description in the NIR does not indicate the values used for maximum methane producing potential (B_o) and methane correction factor (MCF) when calculating the EF, which is not in accordance with the IPCC good practice guidance. The ERT recommends that Slovakia provide in its NIR the values for B_o and MCF used for calculating the EF to enhance transparency.

3. Non-key categories

Other (composting) – CH_4 and N_2O

92. CH_4 and N_2O emissions from composting of MSW were estimated using the IPCC tier 1 methodology and default IPCC EFs for wet weight. Emissions data were extrapolated back to 1990 using data for 1993 and 1994 as a base, which is in accordance with the IPCC good practice guidance. The ERT commends Slovakia for its efforts in reporting these emissions.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

93. Table 6 provides an overview of the information reported and parameters selected by Slovakia under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Assessment of the Party's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1	Sufficient	

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Activities elected under Article 3, paragraph 4, of the Kyoto Protocol	None	
Period of accounting	Commitment period accounting	
Party's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	

94. Section G.1 includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities, and the change from the first commitment period to the second commitment period, paragraphs 95–102 below contain the ERT's assessment of the Party's adherence to the current reporting guidelines and do not provide specific recommendations for reporting of these activities for the 2015 annual submission.

95. The ERT commends Slovakia for improving its estimate of soil carbon stock changes for afforestation, reforestation and deforestation, and for reporting N_2O emissions from disturbance associated with land-use conversion to cropland (deforestation), as well as emissions from biomass burning on lands of afforestation and reforestation following recommendations made in previous review reports.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2, N_2O and CH_4

96. Slovakia did not provide information in its NIR to support its assumption that lime application and N fertilization on lands subject to afforestation and reforestation in the country are not practised. The ERT recommends that Slovakia provide information and evidence to support this assumption in the NIR of its next submission.

97. Slovakia reports "NA" for N fertilization in KP-LULUCF tables: NIR-1; 5(KP-I)A.1.2; 5(KP-II)1 (for N fertilization on lands under afforestation and reforestation); 5(KP-II)4 (for liming on land of afforestation, reforestation and deforestation); and 5(KP-II)5 (biomass burning on lands under afforestation and reforestation without harvesting, and deforestation). As these activities/emission categories were reported as not occurring in the NIR, "NO" is the more appropriate notation key. The ERT recommends that Slovakia correct the notation key in its next annual submission.

Deforestation – CO_2

98. For estimating the carbon stock changes in living biomass for deforestation (forest land converted to cropland, grassland, settlements and other land), it was assumed that the entire biomass is removed in the year of deforestation, and BCEF values were used for estimates of the carbon stock in above-ground biomass before deforestation (NIR section 11.1.3). However, it was unclear to the ERT how the aggregated BCEF values were derived. Information provided in the NIR implies that IPCC default values of wood density (namely

0.40, 0.42 and 0.58 t/m^3 for spruce, pine, beech and oak, respectively, as specified in the NIR, page 257) were used for deriving BCEF values of these species followed by aggregating into conifers (0.65) and broadleaves (0.84).

99. In response to a question raised by the ERT during the review, Slovakia explained that the aggregated BCEF values for conifers and broadleaves were derived as an arithmetic mean of different age classes and species, with the provision of detailed information and a spreadsheet for calculating BCEF values and carbon loss due to deforestation. In response to the list of potential problems and further questions raised by the ERT, Slovakia recalculated the annually weighted mean BCEF values as 0.6025–0.6030 for conifers and 0.7732–0.7752 for broadleaves between 2008 and 2012, based on annual age class structure and species composition in the commitment period. The problem identified during the review was considered resolved and the ERT recommends that Slovakia use this approach for calculating aggregated BCEF values for the emission estimates for deforestation and provide in its NIR detailed background data and a clear description of the procedure used for calculating mean BCEF values in the next annual submission.

100. The ERT also found that calculated carbon stock changes from deforestation are significantly different from those contained in the submitted CRF tables. Slovakia explained that this was due to an input error. The ERT recommends that Slovakia enhance the QA/QC procedures for the next annual submission.

101. Slovakia reported carbon stock changes in litter for deforestation assuming that litter decomposes linearly in the 20 years after conversion. The ERT considers that this assumption is not conservative. The ERT recommends that Slovakia apply the instant oxidation for carbon stock changes in litter for deforestation in next annual submission (see para. 70 above).

102. In response to the list of potential problems and further questions raised by the ERT, Slovakia recalculated the GHG emissions from deforestation (using recalculated BCEF values, instant oxidation of litter pool and correcting input errors) and resubmitted the KP-LULUCF CRF tables. The GHG emissions from deforestation for the period 2008–2012 declined by 3.31 $GgCO_2$ eq (from 577.67 $GgCO_2$ eq to 574.36 $GgCO_2$ eq) compared with the previous submission.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

103. Slovakia has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[6] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

104. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions

[6] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol

105. Slovakia has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

106. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 7
Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO_2 eq

	2014 annual submission[a]		
	As reported	*Revised estimates*	*Final accounting quantity*[b]
Afforestation and reforestation			
Non-harvested land	–1 968 508		–1 968 508
Harvested land	NA		NA
Deforestation	577 669	574 356	574 356
Forest management	NA		NA
Article 3.3 offset[c]	NA		NA
Forest management cap[d]	NA		NA
Cropland management	NA		NA
Grazing land management	NA		NA
Revegetation	NA		NA

Abbreviations: CRF = common reporting format, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

[b] The "final accounting quantity" is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission.

[c] "Article 3.3 offset": for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[d] In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

107. Based on the information provided in table 7 for the activity afforestation and reforestation, Slovakia shall: for non-harvested land, issue 1,968,508 removal units (RMUs) in its national registry; for harvested land, neither issue nor cancel any units in its national registry.

108. Based on the information provided in table 7 for the activity deforestation, Slovakia shall cancel 574,356 assigned amount units, emission reduction units, certified emissions reduction units and/or RMUs in its national registry.

Calculation of the commitment period reserve

109. Slovakia has reported its commitment period reserve in its 2014 annual submission. Slovakia reported its commitment period reserve to be 213,550,986 t CO_2 eq based on the national emissions in its most recently reviewed inventory (42,710.20 Gg CO_2 eq). The ERT notes that based on the submission of revised emission estimates by Slovakia during the review of the 2014 annual submission, the commitment period reserve changed, and the new commitment period reserve is reported as 215,591,676 t CO_2 eq based on the national emissions in its most recently reviewed inventory (43,118.34 Gg CO_2 eq). The ERT agrees with this figure.

3. Changes to the national system

110. Slovakia reported that there are changes in its national system since the previous annual submission. The Party described in its NIR the changes that have been implemented, which mainly include the update of a framework agreement between MZP and the Statistical Office of the Slovak Republic regarding direct access to the relevant statistical data collected in the energy sector. The ERT concluded that Slovakia's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

111. Slovakia reported that there are changes in its national registry since the previous annual submission. The Party described in its NIR the changes which include the change in the organization designated as registry system administrator, and the changes in the structure of the database, technical standard and test results only affecting the EU ETS functionality. The ERT concluded that, taking into account the confirmed changes in the national registry, Slovakia's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

112. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Slovakia provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

113. Slovakia reported that there are changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission. Slovakia explained that it maintains taxes and excise duties on fossil fuels, electricity and mineral oil but that these taxes and excise duties are more linked to the current governmental budgetary situation rather than environmentally sound

behaviour. Since 2009, minor changes have occurred and no impact on any third countries is expected and therefore no specific policies to offset any negative effects have been considered. Moreover, the impact of Slovakia on the world price of biofuels, taking into account the low quantities of biofuels in use in Slovakia, is negligible.

114. Slovakia also explained that the adoption of GHG emission reduction policies (such as introducing EU ETS or Kyoto Protocol emissions trading) as well as increasing the share of renewable energy sources, enhancing energy efficiency and introducing fuel quality standards have had implications for third countries through the underlying carbon market price mechanisms or requirements to comply with new and tighter environmental regulations, for example: the integration of the aviation sector into the trading scheme; addressing the possible impact of carbon leakage (the shift of industrial activity to the countries that do not have GHG emission reduction commitments); and the potential increase of investments in the fuel processing industries. In this last case, the final net impact depends on the benefits derived from the expansion of industrial production and the costs needed to clean up higher levels of pollution, including addressing the consequences.

115. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.

III. Conclusions and recommendations

A. Conclusions

116. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of Slovakia, in accordance with the Article 8 review guidelines.

Table 8
Expert review team's conclusions on the 2014 annual submission of Slovakia

Issue	*Expert review team assessment*	*Paragraph cross references for identified problems*
The ERT concludes that the inventory submission of Slovakia is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources[a]	Complete	
LULUCF[a]	Complete	
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of Slovakia has been prepared and reported in accordance with the UNFCCC reporting guidelines	Generally	See paragraphs 26 and 27 above
The Party's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Yes	
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
Slovakia has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	

Issue	*Expert review team assessment*	*Paragraph cross references for identified problems*
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	
Did Slovakia provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

B. Recommendations

117. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified.

Table 9
Recommendations identified by the expert review team

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
Cross-cutting	QA/QC	Improve the QA/QC plan for the energy sector, detailing the improvements planned and the relevant timetable to implement them	No	Table 3
	Inventory preparation	Increase the transparency of its reporting on the key categories analysis	No	Table 4
		Include in the NIR the relevant information, provided during the review, for the planning and prioritization of the improvements for the next submission	No	Table 4
Energy	Sector overview	Provide a much more detailed fuel-specific breakdown of the AD and EFs used to generate emission estimates for the sectors petroleum refining and chemicals	No	20

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		Provide a brief summary of the national energy balance in the NIR	Yes	21
	Comparison of the reference approach with the sectoral approach and international statistics	Provide more detailed explanations of the difference between CO_2 emissions calculated using the sectoral approach with those calculated using the reference approach	No	23
		Improve the consistency of its reporting and resolve the discrepancies among the three sources of AD for the reference approach	No	23
		Conduct more detailed analysis of the causes behind the discrepancies between the reference and the sectoral approaches for each individual liquid fuel type and provide the numerical data obtained as a result of such an analysis in the next NIR	No	23
		Work closely with the Statistical Office of the Slovak Republic to examine and reduce the significant discrepancies, implementing actions towards the harmonization of data and ensuring that the NEIS data coverage is fully consistent with the NES, and provide adequate and complete explanations in the NIR for any changes undertaken	Yes	24
		Include in the NIR a table presenting a comparison, by fuel type, of fuel consumption data from the NEIS database and from the national statistics	Yes	24
		Provide a more detailed description of additives containing water and biofuel which are reported under biofuels	No	25
		Increase the transparency of the NIR by explaining any discrepancies between the apparent consumption data reported in its inventory to the UNFCCC, the data from the energy balance of the Statistical Office of the Slovak Republic and the data reported to IEA	Yes	25
	International bunker fuels	Provide in the NIR information that the EU ETS is in agreement with the CO_2 emission estimation for domestic aviation performed by EUROCONTROL	No	26

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		Investigate the representativeness of the assumed time-trends of fuel consumption share between aviation and the international bunker throughout the entire time series	Yes	26
	Feedstocks and non-energy use of fuels	Thoroughly review the feedstocks and non-energy use of fuels, clearly describe the new methodology and indicate how the stored fraction of carbon is reported in the sectoral approach in the NIR	No	27
		Establish new QA/QC routines to govern fuel AD across the inventory, and implement specific AD quality checks to compare the NES data against the sum of AD in the energy and industrial processes sectors for all commodities used as fuels, feedstocks, reductants and other non-energy uses	No	28
	Stationary combustion: liquid and solid fuels – CO_2, CH_4 and N_2O	Improve transparency regarding the description of the methodology used for estimating emissions from petroleum refining and the estimation and allocation of the associated emissions in the NIR	No	29
		Include in the NIR the detailed explanations of the methodological choices and recalculations provided during the review in order to increase the transparency of recalculations	No	31
		Review the reference approach allocations of carbon excluded from petrochemical feedstock use	No	34
	Stationary combustion: gaseous fuels – CO_2	Review and analyse the CO_2 EF extrapolation methodology and if still justified provide supporting evidence, otherwise revise the CO_2 EF extrapolation methodology and report the details	No	37
	Coal mining and handling: solid fuels – CO_2	Change the notation key from "NO" to "NE"	Yes	40
Industrial processes and solvent and other product use	Sector overview	Include more detailed information on recalculations in future NIRs, such as that provided during the review, highlighting all changes since the previous submission	No	42
		Continue to improve the transparency of the NIR, adding details that were provided during the review, for example to clarify national inventory data sources, data flows between organizations (companies, regulators, inventory agency) and cross-checks with data reported to other systems	No	44

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		Systematically review and improve the NIR, ensuring that, for each source category, all method details (including source data – AD and EFs, assumptions, extrapolation methods and recalculations – and QA/QC procedures) are clearly described and referenced	No	44
		Include the information provided during the review for several source categories to explain national trends in production, and to explain the derivation of (or extrapolation of) country-specific EFs applied across the time series in the NIR (where possible and without releasing commercially sensitive data)	No	44
		Address the inconsistency identified in reporting emissions from the iron and steel sector by correcting the notation key to "IE"	No	45
	Nitric acid production – N_2O	Review and simplify the method description and provide clear references for all data sources used to inform EFs and AD, including the details provided to the ERT during the review	No	46
	Carbide production – CO_2	Add the information provided to the ERT during the review to future NIRs to improve the transparency of the method and to facilitate quality checking between data in the industrial processes sector and in the energy sector regarding the emissions from the non-energy use of fuels allocated under petroleum coke	No	47
		Strengthens the QA/QC activities regarding AD for commodities such as petroleum coke which are used as reductants in the industrial processes sector and are reported under non-energy use of fuels in the energy sector, and report on progress	No	48
	Iron and steel production – CO_2	Further improve transparency and the description of the carbon balance method in the NIR by clarifying the scope (fuels, materials, source categories) of information presented in the flow diagram provided to the ERT during the review	No	49
		Add in the NIR the comparison of the GHG inventory and EU ETS emission estimates for integrated steelworks, as provided to the ERT during the review, aggregated across all source categories used for the GHG inventory	No	49

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		Improve the transparency of recalculations in future NIRs by presenting a more detailed explanation of the changes to methods, assumptions, AD and EFs	No	50
	Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6	Include the clarification provided to the ERT during the review in the NIR and continue to review and improve the time series of emission estimates, using the reported data	No	51
		Add to the NIR the details provided to the ERT during the review regarding the QA/QC activities applied to the halocarbons and SF_6 estimates in 2011	No	51
Agriculture	Sector overview	Document the changes in the Nex values used, and report the revised N_2O emissions for the entire time series	No	54
	Enteric fermentation – CH_4	Include in the NIR documentation on the use of country-specific data and the methodology used to estimate CH_4 emissions from enteric fermentation, especially an explanation about the regional differences and their implications on GE trends	No	55
	Manure management – N_2O and CH_4	Prepare and report more thorough documentation on Nex for all animal categories	No	59
	Agriculture soils – N_2O	Explain the country-specific methodology in the NIR, especially with regard to the calculation of emissions from N-fixing crops and crop residues	Yes	61
		Estimate N_2O emissions from agricultural soils considering the revised values of the Nex used in the category manure management	No	63
LULUCF	Sector overview	Continue the ongoing technical research in order to provide reliable data for estimating carbon stock changes in living biomass, dead organic matter and soil organic matter	Yes	66
		Use consistently EFs (e.g. BCEF) for estimating carbon gain, loss and/or stock changes in living biomass for forest land and forest land converted to other land-use categories; derive time-series weighted mean BCEF values for each species based on age class structure and species composition; and provide in the NIR detailed background data and a clear description of the procedure for calculating the time-series weighted mean BCEF values	No	67

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		Use default carbon stock values before conversion not only for the annual crops but also for the perennial woody crops, in accordance with the table 3.3.2 of the IPCC good practice guidance for LULUCF, for carbon stocks in a range of climate regions for generic perennial woody cropland and considering the area converted from annual crops and perennial woody crops, respectively	Yes	68
		Include information on the average carbon stock of dead wood per hectare in forest land in the NIR	No	69
		Apply the instant oxidation for carbon stock changes in litter for forest land converted to other land-use categories	No	70
		Improve the transparency of the reporting by providing a clear description of the process used to estimate the mean value of soil organic carbon stocks in each land-use category and refer to the original data source	Yes	71
		Conduct the tier 1 uncertainty analyses at the land-use subcategory level	Yes	72
		Continue the technical work to increase the transparency of the reporting by providing country-specific uncertainty values at the land-use subcategory level for a tier 2 uncertainty analysis	No	72
	Forest land remaining forest land – CO_2	Apply consistent methods for the biomass increment and loss	No	74
	Cropland remaining cropland – CO_2	Estimate and report the carbon stock changes by disaggregating this category into annual cropland converted to perennial woody cropland and perennial woody cropland converted to annual cropland	No	75
		Include in the NIR the explanation regarding the inter-annual spikes in the removals from cropland remaining cropland	No	76
		Include in the NIR the explanation regarding the use of the notation key "NO" for histosols	No	77
	Land converted to grassland – CO_2	Include in the NIR the explanation regarding the significant inter-annual changes occurring in 1992 and 2000–2001	Yes	78

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
	Direct N_2O emissions from N fertilization of forest land and other – N_2O	Provide explanations and evidence in the NIR that the N fertilization in forests is not practised in Slovakia	Yes	79
	CO_2 emissions from agricultural lime application – CO_2	Provide explanations and evidence in the NIR that lime application in forests is not practised in Slovakia	Yes	80
Waste	Sector overview	Estimate emissions from the period 1990–1996 using the interpolation method for industrial and agricultural waste composition (including the justification that gases leaving anaerobic stabilization are considered as a source of emissions according to air pollution control)	Yes	83
	Solid waste disposal on land – CH_4	Provide more details on the fluctuation in emissions caused by agricultural activities	No	84
		Correct the reporting error and verify MSW composition data for the entire time series to enhance transparency and consistency	No	85
		Estimate the emissions for the period 1990–1996 using an extrapolation method in accordance with the IPCC good practice guidance and report them in table 8.14 of the NIR	No	86
	Wastewater handling – CH_4 and N_2O	Include estimates of emissions from stabilization of sewage sludge or provide documentation to show that these emissions do not occur	Yes	88
		Provide detailed information on the ISI methodology to enhance transparency	No	89
		Correct the use of the notation key and strengthen the QA/QC procedures to enhance transparency	No	90
		Provide in the NIR the values for B_o and MCF used for calculating the EF of CH_4 emissions from industrial wastewater discharged into rivers by separate industrial sewers, to enhance transparency	No	91
KP-LULUCF	Afforestation/ reforestation – CO_2, N_2O and CH_4	Provide information and evidence in the NIR to support the assumption that lime application and N fertilization on lands subject to afforestation and reforestation in the country are not practised	No	96

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		Correct the notation key "NA" for N fertilization in the respective KP-LULUCF tables	No	97
	Deforestation – CO_2	Use the approach proposed for calculating aggregated BCEF values for the emission estimates for deforestation and provide in the NIR detailed background data and a clear description of the procedure used for calculating mean BCEF values	No	99
		Enhance the QA/QC procedures on the calculation of carbon stock changes from deforestation	No	100
		Apply the instant oxidation for carbon stock changes in litter for deforestation	No	101

Abbreviations: AD = activity data, B_o = maximum methane producing potential, BCEF = biomass conversion and expansion factor, EF = emission factor, EU ETS = European Union Emissions Trading System, GE = gross energy intake, GHG = greenhouse gas, IE = included elsewhere, IEA = International Energy Agency, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, MCF = methane correction factor, MSW = municipal solid waste, N = nitrogen, NE = not estimated, NEIS = National Emission Information System, NES = national energy statistics, Nex = nitrogen excretion rates, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control.

IV. Questions of implementation

118. No questions of implementation were identified by the ERT during the review.

Annex I

Information to be included in the compilation and accounting database

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2012, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	213 550 986	215 591 676		215 591 676
Annex A emissions for 2012				
CO_2	35 237 878	35 351 628		35 351 628
CH_4	4 181 213	4 327 386		4 327 386
N_2O	2 795 959	2 944 174		2 944 174
HFCs	452 032			452 032
PFCs	21 713			21 713
SF_6	21 403			21 403
Total Annex A sources[c]	**42 710 197**	**43 118 335**		**43 118 335**
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	–435 821			–435 821
3.3 Afforestation and reforestation on harvested land for 2012	NA			NA
3.3 Deforestation for 2012	129 044	54 024		54 024
Activities under Article 3, paragraph 4, for 2012[d]				
3.4 Forest management for 2012				
3.4 Cropland management for 2012				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2012				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2012				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2011

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2011				
CO_2	37 233 465			37 233 465
CH_4	4 124 944	4 252 051		4 252 051
N_2O	2 861 872	3 008 168		3 008 168
HFCs	439 867			439 867
PFCs	17 001			17 001
SF_6	20 744			20 744
Total Annex A sources[c]	**44 697 892**	**44 971 295**		**44 971 295**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–413 418			–413 418
3.3 Afforestation and reforestation on harvested land for 2011	NA			NA
3.3 Deforestation for 2011	201 034	38 164		38 164
Activities under Article 3, paragraph 4, for 2011[d]				
3.4 Forest management for 2011				
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	37 430 608			37 430 608
CH_4	4 088 973	4 216 291		4 216 291
N_2O	3 401 665			3 401 665
HFCs	420 158			420 158
PFCs	21 154			21 154
SF_6	19 902			19 902
Total Annex A sources[c]	**45 382 460**	**45 509 778**		**45 509 778**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–400 419			–400 419
3.3 Afforestation and reforestation on harvested land for 2010	NA			NA
3.3 Deforestation for 2010	140 315	139 676		139 676
Activities under Article 3, paragraph 4, for 2010[d]				
3.4 Forest management for 2010				
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	36 521 211			36 521 211
CH_4	4 222 742	4 346 216		4 346 216
N_2O	3 528 982			3 528 982
HFCs	380 084			380 084
PFCs	17 761			17 761
SF_6	19 389			19 389
Total Annex A sources[c]	**44 690 168**	**44 813 642**		**44 813 642**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–365 812			–365 812
3.3 Afforestation and reforestation on harvested land for 2009	NA			NA
3.3 Deforestation for 2009	47 968	208 750		208 750
Activities under Article 3, paragraph 4, for 2009[d]				
3.4 Forest management for 2009				
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 14
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	40 366 473			40 366 473
CH_4	4 402 530	4 678 461		4 678 461
N_2O	3 842 201			3 842 201
HFCs	335 166			335 166
PFCs	36 162			36 162
SF_6	18 511			18 511
Total Annex A sources[c]	**49 001 044**	**49 276 975**		**49 276 975**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–353 038			–353 038
3.3 Afforestation and reforestation on harvested land for 2008	NA			NA
3.3 Deforestation for 2008	59 309	133 743		133 743
Activities under Article 3, paragraph 4, for 2008[d]				
3.4 Forest management for 2008				
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http:/unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for Slovakia 2014. Available at <http://unfccc.int/resource/docs/2014/asr/svk.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2014. Available at <http://unfccc.int/resource/webdocs/sai/2014.pdf>.

FCCC/ARR/2013/SVK. Report of the individual review of the annual submission of Slovakia submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/svk.pdf>.

FCCC/ARR/2013/SVK/Corr.1. Report of the individual review of the annual submission of Slovakia submitted in 2013. Corrigendum. Available at <http://unfccc.int/resource/docs/2014/arr/svkc01.pdf>.

Standard independent assessment report template, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Janka Szemesova (OMEaKO), including additional material on the methodology and assumptions used. The following documents[1] were also provided by Slovakia:

Gabriela Barančíková, Jarmila Makovníková - *VÝVOJ OBSAHU PÔDNEHO ORGANICKÉHO UHLÍKA NA SLOVENSKU A JEHO AKTUÁLNA ZÁSOBA V ZÁVISLOSTI OD NADMORSKEJ VÝŠKY* (Development of soil organic carbon content on Slovakia and its actual stock in depending on the altitude).

Peter Kováčik, 2001 - *METODIKA BILANCIE ZIVIN V PODACH EKOLOGICKY HOSPODARIACICH PODNIKOV.*

Bernadr Šiška, Ján Horák, 2007 - *EMISIE N_2O Z PIESOČNATO-HLINITÝCH PÔD PODUNAJSKEJ NÍŽINY V PODMIENKACH KLIMATICKEJ ZMENY* (N_2O emissions from sandy loam soils of Danubian lowland in conditions of climate change).

Tomlein P., Tomlein Mi., Tomlein Ma. - *Reporting System Based on Company Certification in Refrigeration Industry.*

Pavol Bielek, 1998 - *DUSÍK V POLNOHOSPODARSKYCH PODACH SLOVENSKA* (Nitrogen in Agricultural Soils of Slovakia), Bratislava.

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[1] Reproduced as received from the Party.

Annex III

Acronyms and abbreviations

AD	activity data
BCEF	biomass conversion and expansion factor
BEF	biomass expansion factor
CaO	calcium oxide
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
DC	degradable organic component
DOC	degradable organic carbon
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
GE	gross energy intake
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
ha	hectare
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
m^3	cubic metre
MCF	methane correction factor
MgO	magnesium oxide
MSW	municipal solid waste
MZP	Ministry of the Environment
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NEIS	National Emission Information System
NES	national energy statistics
Nex	nitrogen excretion rates
NIR	national inventory report
NO	not occurring
OMEaKO	Department of Emissions and Air Quality Monitoring
PFCs	perfluorocarbons

PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
RMU	removal unit
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change